

## Properties of Light and Electricity

### 4-5 The student will demonstrate an understanding of the properties of light and electricity. (Physical Science)

#### 4-5.10 Summarize the factors that affect the strength of an electromagnet.

**Taxonomy level:** 2.4-B Understand Conceptual Knowledge

**Previous/Future knowledge:** Students have not been introduced to the concept of electromagnets in previous grades. Student will further develop the concept of electromagnets in 6<sup>th</sup> grade associated with electric motors and generators (6-5.3).

**It is essential for students to** know the factors that affect the strength of an electromagnet are:

#### *Number of coils of wire*

- By increasing the number of coils of insulated wire around an iron core (such as a bolt or nail), the strength of the electromagnet can be increased.

#### *Number/voltage of batteries*

- By using a battery with a greater voltage or adding more batteries (in series) to the electric circuit, the strength of the electromagnet can be increased.

#### *Properties of the core*

- An iron core will produce the strongest magnet. By increasing the diameter of the core, the strength of the electromagnet can be increased.

**It is not essential for students to** explain why these factors affect the strength of the electromagnet or why the electromagnet is magnetic. Students do not need to make or explain motors and generators.

#### **Assessment Guidelines:**

The objective of this indicator is to *summarize* the factors that affect the strength of an electromagnet; therefore, the primary focus of assessment should be to generalize the major factors giving the electromagnet strength, for example, number of coils of wire, voltage of the battery, and the diameter of the iron core. However, appropriate assessments should also require students to *interpret* diagrams of electromagnets to determine which would be the strongest based on factors described above; *compare* electromagnets to determine which would be the strongest or weakest; or *recognize* which electromagnet would be strongest based on factors described above (only one at a time).